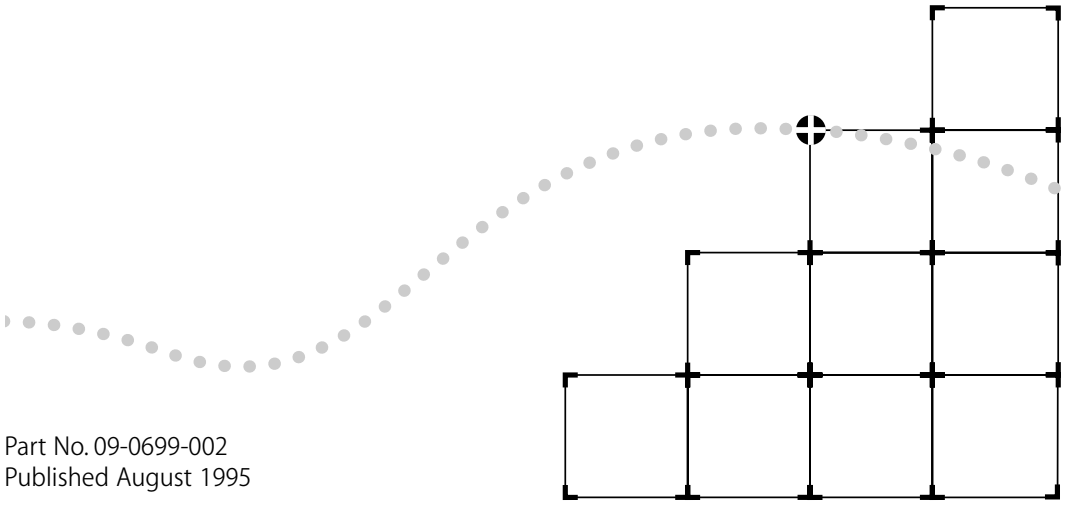
3Com® Impact™ ISDN External Digital Modem User Guide

A member of the 3Com Impact product family



Part No. 09-0699-002
Published August 1995

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About This Guide

Introduction

This guide describes how to install, operate, and troubleshoot the 3Com® Impact™ ISDN External Digital Modem, referred to throughout this guide as the 3Com Impact digital modem.

If the information in the release notes shipped with your product differs from the information in this guide, follow the release notes. Be sure to read the README.TXT or Read Me files on the applicable software utility diskette for the latest product information.

How to Use This Guide

The following table shows where to find specific information in this guide.

If you are looking for:	Turn to:
General information about the 3Com Impact digital modem	Chapter 1
Instructions for installing and operating the digital modem	Chapter 2
Simple digital modem troubleshooting tips	Chapter 3
Instructions for using the AT command line set	Appendix A
Tabular summary of the AT command line set, registers, and result codes	Appendix B
Information about 3Com's technical support	Appendix C

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Conventions

Table 1 and Table 2 list text and icon conventions that are used throughout this guide:

Table 1 Text Conventions

Convention	Description
Text represented as `screen display`	`This typeface` is used to represent displays that appear on your terminal screen, for example: `NetLogin:`
Text represented as **`commands`**	**`This typeface`** is used to represent commands that you enter, for example: **`SETDefault !0 -IP NETaddr = 0.0.0.0`**
Keys	When specific keys are referred to in the text, they are called out by their labels, such as "the Return key" or "the Escape key," or they may be shown as [Return] or [Esc]. If two or more keys are to be pressed simultaneously, the keys are linked with a plus sign (+), for example: Press [Ctrl]+[Alt]+[Del].
Italics	*Italics* are used to denote *new terms* or *emphasis*.

Table 2 Notice Icons

Icon	Type	Description
	Information Note	Information notes call attention to important features or instructions.
	Caution	Cautions contain directions that you must follow to avoid immediate system damage or loss of data.
	Warning	Warnings contain directions that you must follow for your personal safety. Follow all instructions carefully.

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1 Introduction

The Integrated Services Digital Network (ISDN) is a digital communications standard for supporting voice, data, and video applications through conventional telephone wires.

Specifically, ISDN is a method of connecting to the public telephone network using digital technology. ISDN uses the existing copper wire and public telephone network infrastructure. All existing voice services provided by the telephone companies are accessible using ISDN, and for the first time, high-speed dial-up data can be provided cost-effectively to the mass market.

Two electrical interfaces are defined as part of ISDN. The first and less expensive is Basic Rate ISDN, or 2B+D. A Basic Rate Interface (BRI) has two 56 or 64 Kbps (kilobits per second) B (**B**earer) channels for user data, and one 16 Kbps signaling D (**D**ata) channel, used for packet communications with the public network and providing status and control information.

In most regions, the ISDN BRI is priced at 1.5 to 1.8 times the monthly cost of an analog POTS (plain old telephone service) telephone line. You may dial voice or data connections on either or both of the B channels simultaneously. Calls placed from an ISDN line may connect to remote sites that have analog POTS, Switched 56, ISDN BRI, or T1 telephone lines. There is full compatibility with existing services, and no need for ISDN BRI on both ends.

The other electrical interface, which is somewhat more expensive, is the ISDN Primary Rate Interface (PRI). PRI is based on the more expensive and higher-speed T1 networks that are typically deployed at larger sites. PRI consists of 23 B channels and one 64 Kbps D channel, providing large businesses with a greater degree of flexibility.

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The 3Com Impact ISDN External Digital Modem (referred to as the 3Com Impact digital modem throughout this guide) is an external, stand-alone ISDN Basic Rate digital modem for connection with digital telephone services from local telephone companies in North America. It is designed for users who require high-speed access to the Internet, on-line information services, or their corporate local area network (LAN). A typical 3Com Impact digital modem application is shown in Figure 1-1.

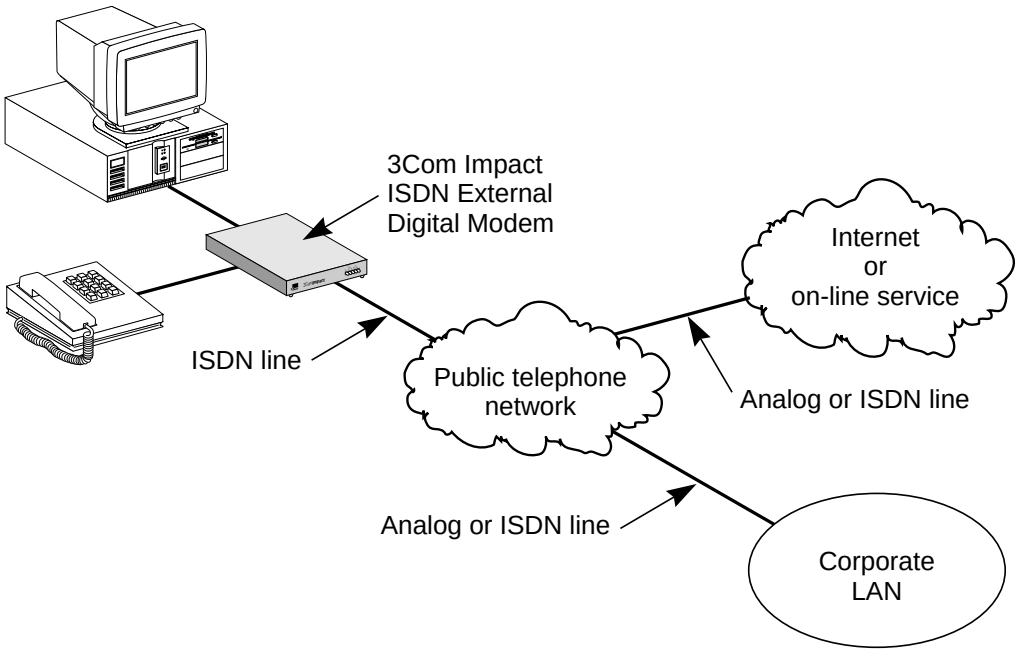

Figure 1-1 Analog and Digital Network Access with the 3Com Impact Digital Modem

Four models of the 3Com Impact digital modem are sold in the U.S. and Canada:

- 3C871 is the IBM® or IBM-compatible PC external digital modem product.
- 3C872 is the IBM or IBM-compatible PC external digital modem product with an internal 14.4 Kbps analog fax modem.
- 3C876 is the Apple® Macintosh® external digital modem product.
- 3C877 is the Apple Macintosh external digital modem product with an internal 14.4 Kbps analog fax modem.

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The 3Com Impact digital modem can be connected to any compatible UL®-listed IBM AT®-compatible or Apple Macintosh personal computer that includes instructions for the installation of hardware and software options to serial ports.

3Com Impact Digital Modem Features

The 3Com Impact digital modem provides the following:

- A complete digital network termination (Basic Rate ISDN NT1).
- Full ISDN signaling support of National ISDN and pre-National ISDN service offerings.
- An asynchronous RS-232-C data port for connectivity to IBM or compatible PC and Apple Macintosh serial ports at rates of up to 115.2 Kbps.
- AT command set dialing.
- Interoperability support through standard protocols like Point-to-Point Protocol (PPP) and V.120. (V.120 is a rate adaption scheme to convert transmission rates from a range of 50 bps to 19.2 Kbps to the B channel 64 Kbps rate.)
- Multilink PPP support, which allows the two B channels to be virtually linked, thereby allowing a maximum digital connection of 128 Kbps.
- Dynamic bandwidth allocation (DBA), which allows you to place a voice call while a Multilink PPP call is active.
- Internal 14.4 Kbps analog fax modem (V.32*bis* compliant) for connection to non-ISDN fax machines and modems (applies to 3C872 and 3C877 models only).
- An analog voice port for attaching analog telephones, answering devices, and fax machines to the ISDN line.
- A graphical user interface for digital modem configuration.
- A comprehensive diagnostic test and LED status display.
- One-year limited warranty within the "Other Hardware Products" category of the 3Com Limited Warranty at the end of this guide.

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Data Capabilities

The 3Com Impact digital modem allows transmission of asynchronous data at speeds of up to 115.2 Kbps over digital ISDN connections with the highest reliability and error-free performance possible. With Multilink PPP, a digital connection of up to 128 Kbps can be established by aggregating the two 56 Kbps or 64 Kbps ISDN B channels. Note that the COM port speed of your PC limits the maximum data transmission rate to no more than 115.2 Kbps.

ISDN technology reduces call setup times by more than 50% compared to V. fast/V.34 analog modem setup times, reducing the time it takes to establish a connection to under three seconds.

This high-speed performance allows you to do the following:

- Dial up the Internet at high data rates
- Access your office's LAN
- Access and download graphics, software, and data files more quickly

Voice Capabilities

The 3Com Impact digital modem's Phone Out port allows the use of existing analog telephone equipment (touch-tone telephones, cordless telephones, and fax and answering machines) to place and receive calls over the ISDN line. When you connect to another ISDN line, setup times are reduced, and voice quality is excellent.

Simultaneous Data and Voice Capabilities

The 3Com Impact digital modem quickly processes data and voice calls simultaneously. For example, you can send a fax or place a voice telephone call while maintaining a high-speed connection to the office LAN; you can also receive a voice telephone call while you are connected to the Internet.

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Analog Modem Capabilities

The 3Com Impact digital modem (models 3C872 and 3C877) includes an integrated V.32*bis* analog modem for data or fax transmissions of up to 14.4 Kbps over the ISDN line. V.42*bis* data compression boosts analog modem throughput to up to 57.6 Kbps.

3Com Impact Digital Modem Package Contents

3Com Impact digital modems are available in Macintosh and PC versions, with or without a built-in V.32*bis* analog fax modem.

Standard Package Contents

The following list describes the package contents common to models 3C871, 3C872, 3C876, and 3C877. Refer to the section "Additional Contents" for any additional items that are specific to a particular model.

- One 3Com Impact ISDN digital modem
- One power cable with an ac wall transformer
- One serial cable
- One RJ-45/RJ-11 ISDN telephone cable
- One 3.5" installation diskette
- *3Com Impact ISDN External Digital Modem User Guide*
- *3Com Impact ISDN External Digital Modem Quick Start Instructions*

Additional Contents

Model 3C871

- One copy of TurboCom™ Windows™ software
- One DB-9-to-DB-25 serial connection adapter

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Model 3C872

- One copy of TurboCom Windows software
- One copy of Delrina® WinComm™ Lite and WinFax® Lite communications software
- One DB-9-to-DB-25 serial connection adapter

ISDN Digital Line Configuration Requirements

The 3Com Impact digital modem requires an ISDN digital telephone line that is properly configured for use with the digital modem.

3Com has determined the optimal ISDN line configurations for the 3Com Impact digital modem and has provided that configuration data to many telephone companies.

To simplify the ordering process for an ISDN digital line, use the following simplified ISDN ordering code:

3ComA * J6

If your digital modem has an internal analog fax modem (Models 3C872 and 3C877), then two directory numbers (telephone numbers) will be required to allow a voice call and a fax modem call to occur at the same time. When you tell the telephone company the ISDN ordering code (3ComA * J6), let the representative know that you will need two directory numbers.

If your telephone company does not support simplified ISDN ordering codes, refer to Table 1-1 for ISDN ordering information.

Present this ordering information to the ISDN line installer or telephone company service representative in your area. Also, make sure that your local telephone company installer provides an RJ-11 or RJ-45 connector for your ISDN line.

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Table 1-1 ISDN Ordering Information by Switch Type

ISDN Line Configuration Parameter	ISDN Switch Type			
	AT&T® 5ESS Custom	**AT&T 5ESS National ISDN-1**	**Northern Telecom® DMS100 National ISDN-1**	**Siemens® EWSD National ISDN-1**
Line Code	2B1Q (no NT1 required)	2B1Q (no NT1 required)	2B1Q (no NT1 required)	2B1Q (no NT1 required)
Directory Numbers	1*	1*	2	1*
Channels	2B alternate circuit-switched data and voice	2B alternate circuit-switched data and voice	2B alternate circuit-switched data and voice	2B alternate circuit-switched data and voice
Terminal Type	A with Point-to-Point	A with Point-to-Point	Functional PVC 2	Functional
TEI	Dynamic	Dynamic	Dynamic	Dynamic
Call Appearances	Idle	Idle	—	—
Supplemental Voice Features	None	None	None	None
EKTS Features	No	No	No	No
D Channel Packet	No	No	No	No
B Channel Packet	No	No	No	No

* Two directory numbers are required for Models 3C872 and 3C877. This allows a voice call and a call using the internal analog fax modem to occur at the same time.

Computer System Requirements

Connect the model 3C871 or 3C872 3Com Impact digital modem to an IBM-compatible computer. Connect the model 3C876 or 3C877 3Com Impact digital modem to an Apple Macintosh computer. Connect the digital modem to a computer that meets UL standards in the United States or is certified to CSA standards in Canada.

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IBM PC or Compatible Requirements

An IBM-compatible PC must have the following:

- A 386, 486, or Pentium® processor
- An available serial communications port

For sustained performance at higher data rates (57.6 Kbps and 115.2 Kbps), it is recommended that your IBM or IBM-compatible PC serial COM port be equipped with a 16C550 UART (universal asynchronous receiver/transmitter). To determine what UART is installed in your PC, run the Microsoft® Diagnostic Program (msd) from the DOS prompt. In addition, for reliable high-speed serial port performance in the Microsoft Windows environment, a TurboCom™ driver for Windows, which replaces the standard Microsoft Windows COM driver, is included with the 3Com Impact digital modem.

- MS-DOS® or IBM PC DOS 3.1 or later operating system
- 640 Kilobytes of conventional memory
- Microsoft Windows 3.1 or later (optional)
- A hard disk drive with 1 MB of free space

Apple Macintosh Requirements

An Apple Macintosh computer must be a Macintosh Plus or later model. It must also have the following:

- An available serial communications port

The highest possible serial port data rate with most Macintosh computers is 57.6 Kbps. Some later Macintosh models (AV and Power Macintosh™) have data rates of up to 115.2 Kbps. 3Com recommends that you use the 8-pin serial communications port on your Macintosh.

- System 7 or later operating system
- A hard disk drive with 1 MB of free space

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Cabling Requirements

Cables to connect the 3Com Impact digital modem to your computer are provided. For IBM or IBM-compatible PCs with a 25-pin serial port, a DB-9–to–DB-25 connection adapter is included with the digital modem.

The asynchronous RS-232-C port on the digital modem, labeled Computer, is a standard DB-9 female connector. The digital modem asynchronous port pin assignments, shown in Table 1-2, conform to standard definitions for data communications equipment (DCE).

Table 1-2 Pin Descriptions

Pin #	Pin Name	Signal Direction
1	Carrier Detect (DCD)	From digital modem
2	Receive Data (RD)	From digital modem
3	Transmit Data (TD)	To digital modem
4	Data Terminal Ready (DTR)	To digital modem
5	Signal Ground (GND)	—
6	Data Set Ready (DSR)	From digital modem
7	Request to Send (RTS)	To digital modem
8	Clear to Send (CTS)	From digital modem
9	Ring Indicator (RI)	From digital modem

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2 Installing and Configuring the Digital Modem

This chapter describes installation and configuration of the 3Com Impact digital modem. In combination with the instructions given in this chapter, follow the instructions given in the appropriate PC or Macintosh computer user guide. Refer to Figure 2-1 and Figure 2-2, showing the digital modem back and front panels, during installation and configuration. If you encounter difficulties after installation, refer to Chapter 3, "Troubleshooting."

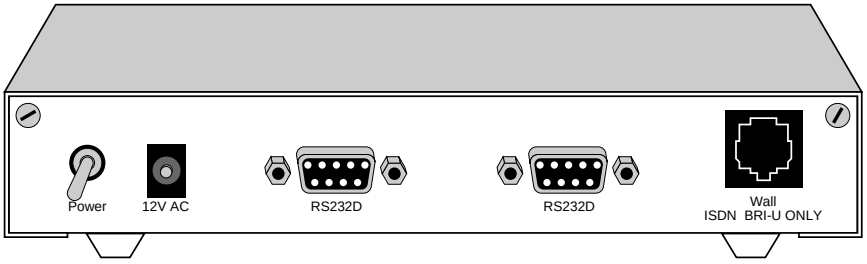

Figure 2-1 Back Panel Power Switch and Connectors

The LED status display, shown in Figure 2-2, consists of five front panel LEDs that are described in Table 2-1.

Figure 2-2 Front Panel LED Indicators

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Table 2-1 Front Panel LED Indicator Definitions

LED	Color	Description
Power	Yellow	**Power Indicator.** Lit when power is on and remains lit as long as power is available from the ac wall transformer plugged into the electrical outlet.
Test	Yellow	**Self-Test/Status.** Flashes when the digital modem is executing its power-up self-test or a user-initiated reset. If the results of the self-test or reset are normal, the LED goes off. If the result of the self-test is abnormal and a fault is detected, the LED remains lit but does not flash.
D-Channel	Yellow	**D Channel/Status.** Provides a quick indication of the ISDN physical network interface and D channel status. If the physical ISDN interface is not synchronized or is disconnected, this LED remains lit. If the physical interface establishes synchronization and the ISDN D channel signaling procedures are not properly established, the LED flashes. Once the physical and D channel signaling are synchronized, the LED goes off. If any physical loss of framing occurs, the LED lights; if there is a loss of D channel signaling, the LED flashes.
B-1	Yellow or green	**B-1 Channel Indicator.** Indicates the activity state of the B-1 channel of the ISDN interface. Green indicates a circuit-switched data call. Yellow indicates a circuit-switched voice call. If a call is in a dialing state, the LED flashes. When a call enters the active state, the appropriate LED color stays lit. When the call is disconnected, the LED goes off.
B-2	Yellow or green	**B-2 Channel Indicator.** Indicates the activity state of the B-2 channel of the ISDN interface. Green indicates a circuit-switched data call. Yellow indicates a circuit-switched voice call. If a call is in a dialing state, the LED flashes. When a call enters the active state, the appropriate LED color stays lit. When the call is disconnected, the LED goes off.

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Installing the 3Com Impact Digital Modem

This installation procedure assumes that you are familiar with IBM and IBM-compatible or Apple Macintosh computers. If you are not, refer to the user guide that accompanied your computer for instructions on hardware installation and operating system commands.

Installing the Digital Modem in an IBM-compatible PC

To install the 3Com Impact digital modem model 3C870 or 3C872 in an IBM or IBM-compatible computer:

1. **Turn off the computer.**
2. **Ensure that the 3Com Impact digital modem power switch is in the Off position.**
3. **Insert the 9-pin male end of the 3Com Impact digital modem-to-PC serial signal cable into the connector labeled Computer on the digital modem's back panel and tighten the connector screws.**
4. **Connect the other end of the 3Com Impact digital modem-to-PC serial signal cable to a serial communications (COM) port on the back of your PC and tighten the connector screws.**

   Most COM port connectors are labeled COM, SERIAL, or RS-232-C. On an IBM AT PC and most laptops or notebooks, connect the cable to a 9-pin COM port connector.
5. **Connect the 3Com Impact digital modem power cable to the connector marked 12V AC on the back panel of the digital modem.**

   See Figure 2-1 for the location of the 12V AC connector on the digital modem's back panel.
6. **Plug the transformer end of the power cable into a standard 117V ac wall outlet.**

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7 Connect the RJ-45 (8-pin) connector end of the RJ-45/RJ-11 ISDN cable to the RJ-45 connector labeled Wall on the digital modem's back panel.

See Figure 2-1 for the location of the RJ-45 connector on the digital modem's back panel.

8 Connect the RJ-11 (6-pin) connector end of the RJ-45/RJ-11 ISDN cable to the RJ-11 ISDN wall jack.

CAUTION: *The 3Com Impact digital modem is designed to operate with Basic Rate ISDN 2B1Q U Interface network terminations. An internal Network Termination device (NT1) is built into the digital modem. Do not connect the 3Com Impact digital modem ISDN port to a standard analog telephone jack or to an external NT1 device. Make sure that it is connected to the ISDN jack.*

9 Turn on the 3Com Impact digital modem by toggling the power switch on the back panel to the On position.

See Figure 2-1 for the location of the power switch on the digital modem's back panel. The indicator LEDs on the front panel (see Figure 2-2) flash momentarily as the unit undergoes a power-up self-test diagnostic.

10 Turn on the computer's power switch.

11 Go to the section "Configuration for IBM PC or Compatible Computer" later in this chapter to configure the 3Com Impact digital modem.

Installing the Digital Modem in an Apple Macintosh Computer

To install the 3Com Impact digital modem model 3C875 or 3C877 in an Apple Macintosh computer:

1 Turn off the computer.

2 Ensure that the 3Com Impact digital modem power switch is in the Off position.

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3 Insert the 9-pin male end of the 3Com Impact digital modem-to-Macintosh serial signal cable into the connector labeled Computer on the digital modem's back panel and tighten the connector screws.

4 Connect the other end of the 3Com Impact digital modem-to-Macintosh serial signal cable to the serial communications port on the back of the Macintosh.

The serial communications port is the mini-DIN, 8-pin serial port connector, indicated on the Macintosh connector panel by the telephone handset imprint.

5 Connect the 3Com Impact digital modem power cable to the connector marked 12V AC on the back panel of the digital modem.

See Figure 2-1 for the location of the 12V AC connector on the digital modem's back panel.

6 Plug the transformer end of the power cable into a standard 117V ac wall outlet.

7 Connect the RJ-45 (8-pin) connector end of the RJ-45/RJ-11 ISDN cable to the RJ-45 connector labeled Wall on the digital modem's back panel.

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9 **Turn on the 3Com Impact digital modem by toggling the power switch on the back panel to the On position.**

See Figure 2-1 for the location of the power switch on the digital modem's back panel. The indicator LEDs on the front panel (see Figure 2-2) flash momentarily as the unit undergoes a power-up self-test diagnostic.

10 **Turn on the computer's power switch and restart.**

11 **Go to the section "Configuration for Apple Macintosh Computer" later in this chapter to configure the 3Com Impact digital modem.**

Configuring the 3Com Impact Digital Modem

The 3Com Impact digital modem requires the five essential configuration parameters below before it can operate properly on an ISDN line. Before configuring the digital modem, make sure you have this information readily available. These five parameters are provided to you at the time of installation of your ISDN line by the telephone company installer.

- ISDN Switch Type
- Phone #1 (local directory telephone number)
- SPID #1 (Service Profile Identifier)
- Phone #2 (if required by the telephone company)
- SPID #2 (if required by the telephone company)

Each of these items is stored in special S registers within the digital modem. These S registers are set by issuing ATSxx= commands to the digital modem. The Impact digital modem software will automatically issue the AT commands to set the S registers as part of the configuration process.

The following three sections describe how to configure the 3Com Impact digital modem using the Windows, DOS, or Macintosh operating systems, respectively.

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After you configure the digital modem and verify that it is working properly, you should install the TurboCom software. Refer to the installation instructions that came with the TurboCom software. This software is required only for IBM PC or compatible computers running Windows 3.X.

Configuration for IBM PC or Compatible Computer

You can configure the 3Com Impact external digital modem for an IBM PC or compatible using either the Windows-based installation program or the MS-DOS®–based installation program.

Configuration Using Windows

To configure the digital modem for an IBM PC or compatible computer using Windows:

1 **Insert the 3Com Impact DOS & Windows Installation Diagnostic Utilities diskette into an available diskette drive.**

2 **Select Run from the File menu. In the Run dialog box, type:**

```
a:setup
```

The check box labeled Run Minimized should be left unchecked.

3 **Click OK.**

The installation process begins copying the configuration program to the hard disk. A message box provides the status of the installation and indicates when it is complete.

4 **Double-click the 3Com Impact icon to access the 3Com Impact Configuration dialog box.**

COM1 is the default COM port.

- If the digital modem is connected to COM1, the 3Com Impact Configuration dialog box appears, as shown in Figure 2-3. Go on to step 5.
- If the digital modem is not connected to COM1, the COM Port Provisioning dialog box appears. Choose the COM port to which the digital modem is connected.

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Click Connect. The 3Com Impact Configuration dialog box appears, as shown in Figure 2-3.

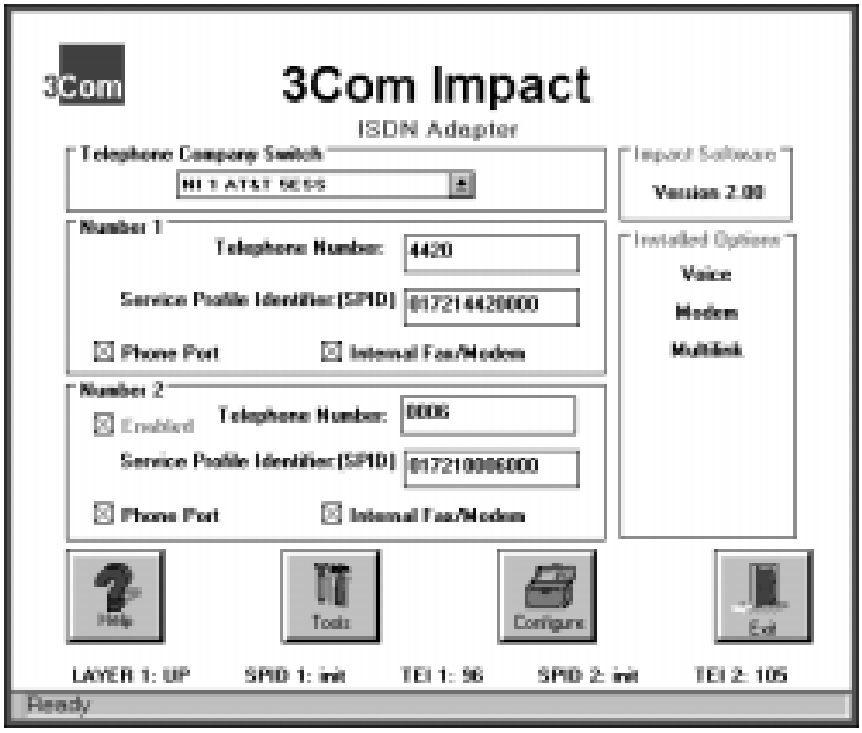

Figure 2-3 Configuration Dialog Box

A status bar below the Help, Tools, Configure, and Exit buttons provides the following ISDN status information:

- Layer 1 status
- Service Profile Identifier (SPID) for telephone numbers 1 and 2
- Terminal Endpoint Identifiers (TEI) 1 and 2 (for information purposes only)

A message bar at the bottom of the dialog box provides help for completing the fields. If you click in a field, the message bar tells you what information to enter in the field. The message bar also provides status information about the digital modem. If the digital modem is disconnected from the ISDN telephone line, for example, a message indicates this condition.

The right side of the dialog box shows the digital modem software version, along with any installed options (such as Multilink PPP or internal analog fax modem).

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5 **Select the type of switch, as specified by your telephone company, from the Telephone Company Switch drop-down list box.**

6 **Click in the Telephone Number field in the Number 1 area and enter the telephone number to which your digital modem is connected.**

7 **Click in the Service Profile Identifier (SPID) field and enter the corresponding SPID for the telephone number you entered in the previous step.**

You should have received this SPID from your telephone company.

CAUTION: *If the ISDN line has been configured with only one telephone number (Point-to-Point), do not include the SPID.*

8 **Specify which device should receive the calls coming to Telephone Number 1.**

You can select Phone Port or Internal Fax/Modem. If your model has the internal analog fax modem installed (Models 3C872 and 3C877), you can select both.

If both boxes are checked, the internal analog fax modem and the phone will both ring, enabling you to answer using either device.

9 **If you have a second telephone number associated with your ISDN telephone line (some telephone companies require two), enter the number and corresponding SPID in the appropriate fields in the Number 2 area.**

10 **Specify which device should receive the calls coming to Telephone Number 2.**

11 **Click the Configure button to download the parameters listed in steps 5 through 10 to your digital modem's S registers.**

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12 If you have changed the Telephone Company Switch type, you must reset the digital modem by turning the power switch off and then on.

13 Verify the configuration.

Check the status bar (located beneath the Help, Tools, Configure, and Exit buttons of the Configuration dialog box) to verify correct configuration. If the parameters were configured accurately and the digital modem is ready to send and receive calls, the status bar fields will appear as shown below. Note that the TEI number(s) are not configured by the user. The TEI number is provided by the telephone company for informational purposes only.

- Layer 1: UP
- SPID 1: Init
- TEI 1: Number from 0 to 127
- SPID 2: Init (if required)
- TEI 2: Number from 0 to 127 (if required)

14 Click Exit to leave the utility.

This completes the configuration procedure.

15 Install the TurboCom software.

Refer to the installation instructions that came with the TurboCom software.

After the TurboCom software is installed, proceed to the "Placing and Receiving Calls" section.

Configuration Using DOS

To configure the digital modem for an IBM PC or compatible computer using DOS:

1 Create a directory on the hard drive, insert the 3Com Impact DOS & Windows Installation Diagnostic Utilities diskette into the PC's diskette drive, and copy all the files from the utility diskette to the hard drive.

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Copy the files to a new DOS directory. For example, to create a directory dddd on your C drive at the C:\> DOS prompt, type:

```
md c:\dddd
```

To copy all files from the diskette to a directory \dddd at the A:\> DOS prompt, type:

```
copy a:*.* c:\dddd
```

2 Execute INSTALL from the hard drive.

At the C:\> DOS prompt, type:

```
INSTALL
```

The configuration program launches and presents the Port Settings screen. To move the cursor around the screen, use the [Up Arrow] and [Down Arrow] keys. To select a parameter, use the [Space Bar].

3 Use the [Space Bar] to select the digital modem's COM port and COM port data rate.

This sets the speed of communication between the 3Com Impact digital modem and the computer during configuration.

When you select the port, the standard interrupt (IRQ) associated with that port is automatically chosen. Select the COM port data rate based on the data rate required by the destination digital modem and the maximum data rate supported by your computer's COM port.

The program does not allow you to select a data rate that exceeds the speed of your COM port.

4 Press [F10] to connect to the 3Com Impact digital modem via the chosen COM port.

The Configuration screen will appear.

5 In the Phone #1 field, enter the telephone number to which your digital modem is connected.

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6 **Enter the corresponding Service Profile Identifier (SPID) in the SPID #1 field for the telephone number you entered in the previous step.**

You should have received this SPID from your telephone company.

CAUTION: *If the ISDN line has been configured with only one telephone number (Point-to-Point), do not include the SPID.*

7 **Specify which device should receive the calls coming to Phone #1.**

You can select Phone Port or Internal Fax/Modem. If your model has the internal analog fax modem (Models 3C872 and 3C877), you can select both. The Phone Port and Internal Fax/Modem check boxes associated with Phone #1 appear to the right of Phone #1.

If both boxes are checked, the internal analog fax modem and the phone will both ring, enabling you to answer using either device.

8 **If you have a second telephone number associated with your ISDN telephone line (some telephone companies require two), enter the number and corresponding SPID in the Phone #2 and SPID #2 fields.**

9 **Specify which device should receive the calls coming to Phone #2.**

10 **Confirm that the parameters listed in steps 5 through 9 are correct.**

When these parameters are updated, the information is read back to the screen. Check to see that the values have been correctly entered.

11 **Press [F10] to update the information in the 3Com Impact digital modem.**

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12 Reset the digital modem by turning the power switch off and then on again.

If the parameters match those registered at the telephone company ISDN switch, the D channel LED lights for a few minutes, flashes for several seconds, and then turns off. If the LED continues to flash or remains lit, see Chapter 3, "Troubleshooting."

13 Press [Esc] to return to the main menu.

Once in the main menu, exit the program.

14 Go to the section "Placing and Receiving Calls" to place your first call.

Configuration for Apple Macintosh Computer

To configure the digital modem for an Apple Macintosh computer:

1 Insert the 3Com Impact Installer Diagnostic Utilities software utility diskette into the diskette drive and copy the files by selecting them and dragging them to the hard drive icon.

The Macintosh operating system automatically places the files in the appropriate folders.

2 Open the 3Com Impact Mac folder and double-click the 3Com Impact Installer program icon to launch it.

The utility program presents the Port Settings screen. To move the cursor around the screen, use the [Tab] key. Select the Modem port and click OK. The Utility dialog box appears.

3 In the Phone Number 1 field, enter the telephone number to which your digital modem is connected.

4 Enter the corresponding Service Profile Identifier (SPID) in the SPID field for the telephone number you entered in the previous step.

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You should have received this SPID from your telephone company.

CAUTION: *If the ISDN line has been configured with only one telephone number (Point-to-Point), do not include the SPID.*

5 **Specify which device should receive the calls coming to Phone Number 1.**

You can select Phone Port or Internal Fax/Modem. If your model has the internal analog fax modem (Models 3C872 and 3C877), you can select both.

If both boxes are checked, the internal analog fax modem and the phone will both ring, enabling you to answer using either device.

6 **If you have a second telephone number associated with your ISDN telephone line (some telephone companies require two), enter the number and corresponding SPID in the Phone Number 2 and SPID Number 2 fields.**

7 **Specify which device should receive the calls coming to Phone Number 2.**

8 **Confirm that the parameters listed in steps 3 through 7 are correct.**

9 **Click the Update Configuration button to update this information to the 3Com Impact digital modem.**

10 **Reset the digital modem by turning the power switch off and then on again.**

If the parameters match those registered at the telephone company ISDN switch, the D channel LED lights for a few minutes, flashes for several seconds, and then turns off. If the LED continues to flash or remains lit, see Chapter 3, "Troubleshooting."

11 **Go to the section "Placing and Receiving Calls" to place your first call.**

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Placing and Receiving Calls

This section illustrates how to place and receive a variety of calls with your 3Com Impact digital modem. The digital modem uses AT commands and S registers for call management. See Appendix A, "AT Command Set Overview," for instructions on use of the AT command set, and Appendix B, "AT Commands, Registers, and Result Codes," for a tabular summary of the AT command lines.

Placing ISDN Data Calls

When you need to place a call from your PC or Macintosh, the 3Com Impact digital modem recognizes the AT command **ATD** to dial a digital ISDN data call. Depending on the setting of register S60, 56 Kbps (default) or 64 Kbps B channel transmission speeds are used. Correct examples of outgoing circuit-switched digital modem commands with dial strings are:

AT D 1 908 555 7891

ATD19085555555

Multilink PPP Calls With Dynamic Bandwidth Allocation

The 3Com Impact digital modem supports Multilink PPP, which allows the two B channels to be virtually linked, thereby allowing a maximum digital connection of 128 Kbps. Note that both your service and the one that you are dialing into must support Multilink PPP, or the virtual linking will not occur. Multilink PPP is enabled by default.

Multilink configuration is facilitated through registers S80, S81, S82, and S83. Additionally, dynamic bandwidth allocation (DBA) in multilink mode is configured in register S70. Register S80 enables (the default) or disables Multilink PPP operation.

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By default, the 3Com Impact digital modem dials the same number for both Multilink PPP channels. If the destination to which the digital modem is dialing to establish a second Multilink PPP channel requires a different telephone number, then this second telephone number is stored in register S81. By default, this register is empty. It must be configured before you establish each Multilink PPP call. If the Multilink PPP destination is a single telephone number for both channels, then be sure to clear register S81 by sending the command **ATS81=<blank>** to the digital modem.

Some Multilink PPP implementations require the use of a Multilink PPP option called the Multilink Endpoint Identifier. This option is configured in registers S82 and S83. Register S82 stores the Multilink Endpoint Identifier Class value. Valid classes are listed in Appendix B, "AT Commands, Registers, and Result Codes." Register S83 stores the actual Multilink Endpoint Identifier. Note that this option is not required in most cases, so these registers typically do not have to be changed. If the Multilink Endpoint Identifier is required, these values will be provided by your system administrator or Internet service provider.

When dynamic bandwidth allocation is enabled (by default), you can place a voice call from a device that is attached to the Phone Out port while a Multilink PPP call is active. When you lift the telephone handset to place a voice call, the digital modem automatically removes one of the Multilink PPP connections and uses it for the voice call. Once the voice call ends, the digital modem automatically reestablishes that channel for Multilink PPP operation.

There may be cost implications due to the use of two B channels for Multilink PPP. Check with your service providers, such as the telephone company, Internet access provider, or on-line service provider.

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Placing Analog Modem Calls

To place a call from your PC or Macintosh using the optional V.32*bis* 14.4 Kbps internal analog fax modem (included with models 3C872 and 3C877), use the AT command ATDT (for connection to an analog modem using touch-tone dialing) or ATDP (for connection to an analog modem using pulse dialing).

Using Communications Software to Place Calls

If you are using standard communications software, select a Hayes-compatible modem configuration and dial out through the 3Com Impact digital modem. Refer to your communications software documentation for more details.

Receiving Data Calls

Incoming circuit-switched data calls from other 3Com Impact digital modems or from ISDN devices and Sw56 equipment may be received by the digital modem.

If auto answer is disabled (the default) in register S0, a RING message is delivered to the Computer port upon reception of an incoming data call to the digital modem. The command AT A answers the incoming data call. A CONNECT message is then delivered to the Computer port upon successful connection.

If auto answer is enabled, the call is automatically answered and a CONNECT message, indicating the speed of the connection, is delivered to the Computer port.

Using the Phone Out Port

If you have analog touch-tone telephones, answering machines, fax machines, external analog modems, or other analog telephone devices, connect them to the 3Com Impact digital modem's RJ-11 modular jack labeled Phone Out on the digital modem's back panel (see Figure 2-1).

The 3Com Impact digital modem does not support pulse dialing (rotary) telephones.

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CAUTION: *The 3Com Impact digital modem is designed to operate with telephones that are compatible with the original AT&T 2500 touch-tone telephone standard. 3Com guarantees proper operation of up to three compatible touch-tone devices on the Phone Out port. The digital modem is designed to provide power and ringing for these three devices on up to 100 feet of AWG 26 or heavier AWG wiring. Although the digital modem may function satisfactorily at longer cable distances with more than two attached telephones, proper operation at longer cable distances is not guaranteed in all situations.*

Specialized telephone equipment, most notably speaker phones that draw significantly larger amounts of power, may not work at all on the digital modem's Phone Out port. These devices do not conform to the loop current (power) specification of the 2500 touch-tone telephone standard, and their operation is not guaranteed.

Placing Calls Using the Phone Out Port

To place an outgoing call, simply take the telephone handset or external fax machine off the hook, wait for a dial tone, and dial the destination telephone number.

Receiving Calls Using the Phone Out Port

Incoming calls to the telephone number assigned to the Phone Out port ring at the Phone Out port unless you are busy on another Phone Out port call. If the port is busy, the incoming call is automatically disconnected.

If you have a digital modem with an internal analog fax modem (models 3C872 and 3C877) you can have calls routed to the internal analog fax modem when the Phone Out port is busy. To do this, the digital modem must be configured to allow a call to be routed to both the Phone Out port and the internal analog fax modem, as described in the section "Configuring the 3Com Impact Digital Modem."

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Protocol Support

Async-Sync PPP Conversion

One of the most unique and powerful features of the 3Com Impact digital modem is its ability to convert asynchronous Point-to-Point Protocol (PPP) into synchronous (HDLC-based) PPP that can be transported in ISDN B channels to communications servers and routers that have integrated ISDN Basic Rate (BRI), Primary Rate (PRI), or T1 access lines.

A wide variety of software and internetworking products has been tested for interoperability with the 3Com Impact digital modem's Async-Sync PPP™ conversion software.

QuickSelect

The 3Com Impact digital modem supports V.120 and Async-Sync PPP conversion. The digital modem uses a technique called QuickSelect™ so that you do not have to manually select the proper protocol for each ISDN call. With QuickSelect enabled (the default), the digital modem automatically detects and uses the required protocol.

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3 TROUBLESHOOTING

This chapter explains how to isolate and solve simple problems encountered with the 3Com Impact digital modem. Problems may stem from incorrect option settings or improper installation. Follow the steps outlined in this chapter.

There are no user-serviceable parts inside your 3Com Impact digital modem. Unauthorized opening of the unit will void the warranty.

Troubleshooting Tips

Before you call 3Com's technical support organization for assistance, check the following:

1 **The power supply is connected and the power LED is on.**

2 **Turn the 3Com Impact digital modem power switch off and then on again several times and observe the Test LED.**

During power-up self-test, the Test LED flashes.

- If the Test LED flashes and remains on for more than a few minutes, there is an internal failure. Notify your reseller that the 3Com Impact digital modem has failed the self-test, and order a replacement.
- If the LED goes off after the test has been completed, the test has been successful.

3 **Verify that the ISDN cable is connected to the digital modem, and make sure it is connected to the ISDN wall jack.**

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The 3Com Impact digital modem will not operate if connected to an analog telephone wall jack. Make sure that the digital modem is connected directly into the ISDN wall outlet without connection to any intermediate telephone equipment (an NT1 device is not required with this digital modem).

4 Make sure that the cables provided by 3Com or a 3Com authorized reseller are in good condition and show no evidence of wear or other physical damage.

If damage is apparent after close inspection, contact your reseller for replacement cables.

5 Monitor the status of the D channel LED.

- If you are connected to a live digital ISDN line, the D channel LED remains lit for up to a few minutes after the self-test but then begins to flash.

  When the D channel LED flashes, it indicates that the ISDN signal is present.

  When the D channel LED goes out, it indicates that a valid communication channel has been established and calls may be attempted by the user.

- If the D channel LED remains lit after more than a few minutes, it is likely that there is a poor physical connection to the local telephone company.

  This fault can be caused by a damaged cable, a broken wire, a damaged connector, a nonstandard U interface (proprietary AMI line coding), or a problem within the telephone company network. If the telephone wires at your site appear to be satisfactory, call your local telephone company for repair of telephone company equipment and troubleshooting assistance.

- If the D channel LED flashes for more than a few minutes without going out, there is probably a mismatch between the settings of the ISDN line and the 3Com Impact digital modem configuration.

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Check the Service Profile Identifier (SPID) entry and the Phone# information in the digital modem software configuration utility.

If you have verified once again that your SPID and Phone# parameters are entered properly and the D channel LED continues to flash without going out, call your telephone company, verify that you have been given the correct SPID and Phone# information, and ask whether the ISDN line is Point-to-Point. If the ISDN line is Point-to-Point, be sure not to include the SPID in the configuration.

Also verify that the telephone company has configured the ISDN line properly for the 3Com Impact digital modem product (see Table 1-1). If the D channel LED does not go out after these verifications, call your reseller for line configuration and troubleshooting assistance.

- If the D channel LED goes out, the digital modem is ready to place and receive calls.

  If you have a standard analog telephone attached to the digital modem's analog voice port, you can place a voice call in the normal fashion. You should have the ability to obtain a dial tone, enter digits, and connect to your destination. While the voice call is being placed, either the B-1 or B-2 channel LEDs will flash yellow. Once the voice call is connected and the other party picks up the phone, the B-1 or B-2 LEDs that were flashing will now remain lit until the call is disconnected.

  If you do not hear a dial tone or cannot establish a call, there is most likely a problem with the configuration of your ISDN line. Call the telephone company and have it verify that your line is configured for circuit-switched voice and data service.

6 Monitor the B-1 and B-2 LEDs.

Data calls typically involve more interactions than voice calls do. Your computer, applications software, or the remote destination can prevent establishment of a data call. If you have been able to perform all of the above steps, your 3Com Impact digital modem is most likely functioning correctly.

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- If you are unable to establish a data call, carefully monitor the B-1 and B-2 LEDs while attempting a data call. The B-1 and B-2 LEDs flash green during the data call establishment phase. They then remain continuously green once the data connection is established.
- If neither of the B-1 or B-2 LEDs flashes green, check to make sure that your computer is turned on and operational, that your 3Com Impact digital modem cable is properly connected and not damaged, and that your application software has sent an AT dial command in the proper format.

  Depending upon the location of the destination call you are dialing, there may be an incompatible local or toll telephone company. Though this is less likely, if you suspect a telephone company problem in dialing local or toll data connections, contact your local telephone company and have it verify that you can dial a data call to the destination telephone number.

7 If you are able to establish a data call, in which the B-1 or B-2 green LED remains lit and you receive a CONNECT message at your application software, but you are unable to send data, then it is possible that:

- There is a difference in the local and remote B channel data rates.
- There is a mismatch in the data communications protocols.
- There is an interoperability mismatch between the local and remote applications.
- Make sure that the local and remote data applications have communication capability and are properly configured. Once you have verified that communication capability exists, make sure that the B channel call data rate is the same as the remote destination call data rate. The default B channel data rate used by the digital modem is 56 Kbps. Under some circumstances, the data rate may be increased to 64 Kbps at both ends of the connection.

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8 If problems persist, refer to Appendix C, "Technical Support."

If you have gone through the troubleshooting tips and still have not been able to resolve the problem, contact technical support. Please have the serial number of your 3Com Impact digital modem; a list of symptoms, including any LED status information; computer display status; and relevant information about your application software ready when you call.

Downloading Firmware to Your External Digital Modem

Data communications is an evolving technology. To keep pace with this evolution, your digital modem has been uniquely designed to be user-upgradable. As recommended by 3Com technical support, you may need to download the latest firmware to your digital modem. You can use the following procedure to download the updated firmware to your digital modem.

For IBM and IBM-Compatible PCs

This section provides instructions on downloading firmware from your PC to your digital modem.

1 Obtain the latest firmware file from the 3Com FTP site ftp.3Com.com.

2 Copy the firmware file to your computer.

3 Double-click the 3Com Impact icon to access the Configuration dialog box, shown in Figure 2-3.

4 Click the Tools button.

The Firmware and Tests buttons appear.

Use the Tests tool only under the direction of service personnel.

5 Click the Firmware button.

The Firmware dialog box appears.

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6 **Select the firmware file that you copied from 3Com's FTP site and click OK to start the download to the 3Com Impact digital modem.**

The download will take several minutes.

7 **Click the Exit button to exit the utility.**

For Macintosh Computers

This section provides instructions on downloading firmware from your Macintosh to your digital modem.

1 **Obtain the latest firmware file from the 3Com FTP site ftp.3Com.com.**

2 **Copy the firmware file to your computer.**

3 **Double-click the 3Com Impact icon to access the Utility dialog box.**

Use the Diagnostics button only under the direction of service personnel.

4 **Click the Update Firmware button.**

5 **Select the firmware file that you copied from 3Com's FTP site and click OK to start the download to the 3Com Impact digital modem.**

A message box appears and allows you to confirm the download. The download will take several minutes.

6 **Click OK.**

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A AT Command Set Overview

Most communications software supports an AT command line initialization string. The initialization string sets up the 3Com Impact digital modem to negotiate and connect with a remote modem. Before dialing, the software sends the initialization string to the 3Com Impact digital modem. The communications software or server stores the initialization string and uses it each time it dials. In most situations, an initialization string is not necessary with the 3Com Impact digital modem. If an initialization string is required by the communications software or server, use the Hayes default initialization string.

Software that communicates using AT commands (ATtention codes) is required to control the 3Com Impact digital modem. You can enter these codes manually. However, they are often entered automatically by modem communications software. For a summary of the AT command set, see Appendix B, "AT Commands, Registers, and Result Codes." Below is a sample AT command line:

```
AT V1 D 1 800 555 3333 [Enter]
```

AT gets the attention of your 3Com Impact digital modem.

V1 sets the digital modem to verbose mode so that it sends its responses in English words instead of numbers.

D tells the digital modem to dial an ISDN digital connection to the phone number that follows.

[Enter] sends the command line to your 3Com Impact digital modem.

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Follow these steps to use AT commands:

1 **Launch your communications software.**

Be sure your communications software is in terminal mode.

2 **Be sure the digital modem is in command mode (sometimes called local mode or terminal mode) so that it interprets your commands.**

When your computer is powered on, the digital modem automatically starts in command mode. If you have recently used the digital modem to make a call and have not yet disconnected, type +++ to switch to command mode.

3 **Type:**

`AT <commands> [Enter]`

An AT command line starts with the characters AT. The command line can accept up to 40 command characters in the line (not including the two AT characters, spaces, or [Enter]).

After completing its tasks, the 3Com Impact digital modem sends a message to the screen.

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B AT Commands, Registers, and Result Codes

The 3Com Impact ISDN digital modem commands are summarized in Table B-1, modem commands for the internal analog modem in Table B-1, remote S registers in Table B-3, and digital modem result codes in Table B-4.

AT Command Set for the 3Com Impact Digital Modem

Table B-1 summarizes the AT command set.

Table B-1 AT Command Set Summary

Command	Function (Example)	Description
A	Answer incoming circuit-switched digital modem call (AT A)	Answers an incoming call.
&C	Serial port CD control (AT &C2)	&C0 forces CD to remain on at all times. &C1 forces CD to follow the state of carrier from the remote system. CD turns on after CONNECT message is sent to host (default). &C2 forces CD to remain on except temporarily after disconnect.
D	(ATD5551234)	Dials an outgoing 56/64 Kbps circuit-switched digital connection.
DT	(ATDT5551234)	Dials an outgoing analog modem call, using the optional V.32*bis* modem, at a maximum modem line speed of 14.4 Kbps using touch-tone dialing.
DP	(ATDP5551234)	Dials an outgoing analog modem call, using the optional V.32*bis* modem, at a maximum modem line speed of 14.4 Kbps using pulse dialing.

(continued)

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Table B-1 AT Command Set Summary (continued)

Command	Function (Example)	Description
&D	DTR control (AT &D0)	&D0 causes digital modem to ignore DTR from host.
		&D1 causes digital modem to enter command state on detecting on-off transition of DTR.
		&D2 causes digital modem to hang up current calls upon on-off transition of DTR and prepares serial port to accept AT command at any speed (default).
E	AT command echo (AT E0)	E0 disables the echo of AT commands back to the host computer.
		E1 enables the echo of AT commands to the host computer (default).
&F	Restore factory defaults (AT &F)	Restores all factory default settings.
H	Hang up (AT H)	Hangs up the current connections.
I	Identification (AT I0)	I0 displays the product and options ID.
		I1 displays the flash memory checksum.
		I4 displays the modem product code, precomputed checksum, firmware revision number, model, interface type, country code, and data pump model.
O	Enter connect state (AT O)	Causes the digital modem to go out of command mode into on-line mode.
Q	Result code control (AT Q0)	Q0 enables the output of result codes (default).
		Q1 disables the output of result codes.
		Q2 disables the output of result codes in answer mode only.
\Q	Serial port flow control (AT \Q1)	\Q0 disables flow control.
		\Q1 enables bidirectional XON/XOFF software flow control.
		\Q3 enables bidirectional RTS/CTS hardware flow control (default).
%R	Read all S registers (AT %R)	Provides an output list of all S registers.
SN?	Read configuration register (AT S60?)	Reads a specific S register setting.
SN=	Write configuration register (AT S60=64)	Writes to a specific S register.

(continued)

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Table B-1 AT Command Set Summary (continued)

Command	Function (Example)	Description
\S	Read on-line status: command settings (AT \S)	Reads the status of any parameters that have been modified through AT commands.
\T	Link inactivity timer (AT \T1)	\T0 disables inactivity timer (default). \Tn link inactivity timer in minutes. The digital modem automatically disconnects the call if no activity is sensed within *n* (n = 0–255) minutes.
V	Result code format (AT V0)	V0 enables short form result codes. V1 enables long form result codes (default).
&W	Stores configuration (AT &W)	Stores the configuration of all S registers that are not part of the digital modem initial configuration set.
Z	Reset (AT Z)	Disconnects all calls in progress and performs a complete digital modem system reset.
+++	Enter command state	Causes digital modem to enter the command state if it is currently in the on-line state.
$B	Set baud rate (AT $B57600)	0 — Autobaud (default). Other settings are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
%V	Show version number (AT %V)	Displays digital modem firmware version.

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AT Command Set for Internal Analog Fax Modem

Table B-1 summarizes the AT command set for the internal analog modem.

Table B-2 AT Command Set Summary for the Internal Analog Modem

Command	Function (Example)	Description
B	Set 1200 bps (operation= 0)	Initiates calls using either ITU-T V.220 or Bell 212a at 1200 bps.
		0 — V.22
		1 — Bell 212a (default)
C1	ATC1	Modem responds with OK
F	Select modem modulation mode	0 — Auto detect (default)
		1 — V.21/Bell 103
		3 — V.23
		4 — V.22/Bell 212a
		5 — V.22*bis*
		6 — V.32*bis*/V.32 4800 bps
		7 — V.32*bis*/V.32 7200 bps
		8 — V.32*bis*/V.32 9600 bps
		9 — V.32*bis* 12000 bps
		10 — V.32*bis* 14400 bps
L	Modem speaker volume control	0,1 — Low
		2 — Medium (default)
		3 — High
M	Modem speaker operation	0 — Off
		1 — On during handshaking, off while receiving carrier (default)
		2 — On during handshaking, on while receiving carrier
		3 — Off while receiving carrier, on during answering

(continued)

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Table B-2 AT Command Set Summary for the Internal Analog Modem (continued)

Command	Function (Example)	Description
X	Select the subset of result messages that will be used by the modem to inform the PC of the results of commands	0 — Basic call progress 1 — Basic call progress and connection rate 2 — Basic call progress and connection rate 3 — Basic call progress and connection rate 4 — All call progress and connection rate
%E	Line quality monitor control	0 — Disable 1 — Enable and retrain 2 — Enable and fallback/forward 3 — Enable and auto-retrain but hang up immediately if line quality becomes insufficient
%L	Return received line signal level	Returns a value that indicates the received line signal level
%Q	Report line signal quality	Reports the line signal quality
&G	Generate guard tone	0 — Disable (default) 1 — Select 1800 Hz guard tone
&V	Display current configuration	
\A	Set MNP max block size	0 — 64 1 — 128 2 — 192 3 — 256
\B	Transmit break to remote	Sends break to remote modem with a length in multiples of 100 ms (n x 100 ms) in non-error corrected mode only. n = 1–9
\G	End-to-end, modem-to-modem flow control	0 — Disable (default) 1 — Enable
\L	MNP mode	0 — Stream (default) 1 — Block

(continued)

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Table B-2 AT Command Set Summary for the Internal Analog Modem (continued)

Command	Function (Example)	Description
\N	Set preferred error-correcting mode to be negotiated in a subsequent data connection	0 — Normal speed buffered 1 — Direct 2 — Reliable link 3 — Auto reliable 4 — Force LAPM 5 — Force MNP
-K	MNP extended services	Enables/disables conversion of a V.42 LAPM connection to an MNP 10 connection. 0 — Disable 1 — Enable 2 — Enable; inhibits MNP extended services initiation during V.42 LAPM answer mode detection phase
-Q	MNP 10 fallback to 2400 bps (V.22*bis*)/1200 (V.22)	Enables or disables fallback from MNP 10 to V.22*bis*/V.22. 0 — Disable 1 — Enable (default)
*H	Link negotiation speed	Controls the connection speed for link negotiations before upshift occurs between two MNP Class 10 modems. 0 — Highest rate (default) 1 — 1200 bps 2 — 4800 bps
+F	All fax commands (AT+fax sub-command)	All fax commands

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Remote S Registers

The 3Com Impact digital modem supports the S registers listed in Table B-3. All S registers except S0 are the 3Com extended registers.

Table B-3 Remote S Registers

Registers	Descriptions
S0	Auto Answer
	0 — Disabled (default)
	1 — Enabled
S50	ISDN Switch Signaling Type:
	1 — AT&T 5ESS Custom
	3 — NI-1/AT&T 5ESS (default)
	6 — NI-1/NTI DMS 100 or Siemens EWSD
S51	Phone #1
S52	Phone #1 Service Profile ID (SPID)
S53	Phone #2 (if required by your carrier)
S54	Phone #2 Service Profile ID (SPID) (if required by your carrier)
S55	Terminal Endpoint Identifier 1:
	Stores the first TEI assigned by the switch if a second directory number is required by your carrier. A value of 255 indicates no TEI has been assigned. This field is read-only.
S56	Terminal Endpoint Identifier 2:
	Stores the second TEI assigned by the switch. A value of 255 indicates no TEI has been assigned. This field is read-only.
S57	Terminal Initialization State:
	Indicates the status of the first TEI using SPID 1. This field is read-only.
	0 — 3Com Impact digital modem has not attempted initialization
	1 — 3Com Impact digital modem has initialized successfully using SPID 1
	2 — 3Com Impact digital modem has failed initialization using SPID 1

(continued)

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Table B-3 Remote S Registers (continued)

Registers	Descriptions
S58	Terminal Initialization State: Indicates the status of the second TEI using SPID 2. This information is provided only if your carrier requires a second directory number. This field is read-only. 0 — 3Com Impact digital modem has not attempted initialization 1 — 3Com Impact digital modem has initialized successfully using SPID 2 2 — 3Com Impact digital modem has failed initialization using SPID 2
S59	U Interface Status: This field is read-only. 0 — U interface is not synchronized with the switch 1 — U interface is synchronized and ready
S60	B Channel Data Rate: 56 — 56 Kbps (default) 64 — 64 Kbps
S61	Outgoing Call Type: 0 — Follow dial modifiers (default) 2 — ISDN 3 — Internal analog fax modem
S63 (only for models with an internal fax modem)	Incoming Voice Call Routing (bit map) Bit Position/Feature: 0 — Phone #1 internal analog fax modem 1 — Phone #1 Phone Out port 2 — Phone #2 internal analog fax modem 3 — Phone #2 Phone Out port
S65	Voice Automatic Number Identification: Displays the phone number of an incoming voice call. This field is read-only.
S66	Data Automatic Number Identification: Displays the phone number of an incoming data call. This field is read-only.

(continued)

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Table B-3 Remote S Registers (continued)

Registers	Descriptions
S70	Dynamic Bandwidth Allocation: 0 — DBA disabled 1 — DBA enabled (default)
S71	B Channel Protocol: 0 — QuickSelect (default) 1 — Async-Sync PPP conversion 2 — V.120
S73	V.120 Frame Type: 0 — I frame (default) 1 — UI frame
S74	V.120 Maximum Frame Size (range 240–256): 256 — Maximum frame size of 256 is used (default) 248 — Maximum frame size of 248 is used (for AdTran® compatibility, use 253)
S80	Multilink PPP: 0 — Disable 1 — Enable (default)
S81	Multilink PPP Directory Number: If the destination to which you are dialing a Multilink PPP call requires two separate directory numbers, you must include the second telephone number of up to 15 digits in this S register. If left blank, then the number used to dial the first link is used.
S82	Multilink PPP Endpoint Identifier Class: If required, this information is provided by your Internet service provider. 1 — Locally Assigned Address 2 — Internet Protocol (IP) Address 3 — IEEE 802.1 Globally Assigned MAC Address 4 — PPP Magic-Number Block 5 — Public Switched Network Directory Number
S83	Multilink PPP Endpoint Identifier (up to 20 characters) If required, this information is provided by your Internet service provider.

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Digital Modem Result Codes

Table B-4 lists the 3Com Impact digital modem result codes.

Table B-4 3Com Impact Digital Modem Result Codes

Short Form	Long Form	Meaning
0	OK	Indicates that the most recent command or action was successfully completed.
2	RING	Indicates that an incoming call is present and no AT Answer command is outstanding.
3	NO CARRIER	Indicates that the most recent call attempts did not establish a call or that the physical ISDN interface is not operational.
4	ERROR	Indicates that the most recent command or action was not successfully completed.
7	BUSY	Indicates that the most recent call attempt did not connect because the remote destination was busy.
5	CONNECT 1200	Indicates 1200 bps analog modem connection.
10	CONNECT 2400	Indicates 2400 bps analog modem connection.
11	CONNECT 4800	Indicates 4800 bps analog modem connection.
12	CONNECT 9600	Indicates 9600 bps analog modem connection.
15	CONNECT 14400	Indicates 14400 bps analog modem connection.
28	CONNECT 28800	Indicates 28800 bps analog modem connection.
56	CONNECT 56000	Indicates 56000 bps digital modem connection.
64	CONNECT 64000	Indicates 64000 bps digital modem connection.

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C Technical Support

3Com provides easy access to technical support information through the variety of services described in this appendix.

On-line Technical Services

3Com offers worldwide support, through the following:

- 3Com Bulletin Board Service (3ComBBS)
- World Wide Web Site
- Ask3Com℠ on CompuServe®
- 3ComFacts℠ Automated Fax Service

3Com Bulletin Board Service

3ComBBS contains patches, software, and drivers for all 3Com products, as well as technical articles. This service is available via modem seven days a week, 24 hours a day. To reach the service, set your modem to 8 data, no parity, and 1 stop bit.

Country	Baud Rate	Telephone Number
Australia	up to 14400 baud	(61) (2) 955 2073
France	up to 14400 baud	(33) (1) 69 86 69 54
Germany	up to 9600 baud up to 9600 baud	(49) (89) 627 32 188 (49) (89) 627 32 189
Hong Kong	up to 14400 baud	(852) 537 5601
Italy (fee required)	up to 9600 baud	(39) (2) 273 00680
Japan	up to 14400 baud	(81) (3) 3345 7266
Singapore	up to 14400 baud	(65) 534 5693
Taiwan	up to 14400 baud	(886) (2) 377 5838 (886) (2) 377 5840
U.K.	up to 14400 baud	(44) (144) 227 8278
U.S.	up to 14400 baud ISDN V.120	(1) (408) 980 8204 (1) (408) 654-2703

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World Wide Web Site

Access the latest networking information on 3Com's World Wide Web site by entering our URL into your Internet browser:

http://www.3Com.com/

This service features news and information about 3Com products, customer service and support, 3Com's latest news releases, selected articles from 3TECH®, 3Com's award-winning technical journal, and more.

Ask3Com on CompuServe

Ask3Com is a CompuServe-based service containing patches, software, drivers, and technical articles about all 3Com products, as well as an interactive forum for technical questions. To use Ask3Com, you need a CompuServe account.

To use Ask3Com:

1. **Log on to CompuServe.**
2. **Enter `go threecom`**
3. **Press [Return] to see the Ask3Com main menu.**

3ComFacts Automated Fax Service

3Com Corporation's interactive fax service, 3ComFacts, provides data sheets, technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, seven days a week. Within this service, you may choose to access CardFacts® for adapter information, or NetFacts® for network system product information.

- **CardFacts** provides adapter installation diagrams, configuration drawings, troubleshooting instruction, and technical articles.

  Document 9999 provides you with an index of adapter documents.

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- **NetFacts** provides data sheets and technical articles on 3Com Corporation's hub, bridge, router, terminal server, and software products.

  Document 8888 provides you with an index of system product documents.

  Call 3ComFacts using your touch-tone telephone. International access numbers are:

Country	Fax Number
Hong Kong	(852) 537 5610
U.K.	(44) (144) 227 8279
U.S.	(1) (408) 727 7021

Local access numbers are available within the following countries:

Country	Fax Number
Australia	800 123853
Denmark	800 17319
Finland	98 001 4444
France	05 90 81 58
Germany	0130 8180 63

Country	Fax Number
Italy	1678 99085
Netherlands	06 0228049
Norway	800 11062
Sweden	020 792954
U.K.	0800 626403

Support from Your Network Supplier

If additional assistance is required, contact your network supplier. Many suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- Diagnostic error messages
- A list of system hardware and software, including revision levels
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, see the following section on how to contact 3Com.

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Support from 3Com

If you are unable to receive support from your network supplier, technical support contracts are available from 3Com.

In the U.S. and Canada, call **(800) 876 3266** for customer service.

Returning Products for Repair

A product sent directly to 3Com for repair must first be assigned a Return Materials Authorization (RMA) number. A product sent to 3Com without an RMA number will be returned to the sender unopened, at the sender's expense.

To obtain an RMA number, call or fax:

Country	Telephone Number	Fax Number
U.S. and Canada	(800) 876 3266	(408) 764 7120

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LIMITED WARRANTY

HARDWARE: 3Com warrants its hardware products to be free from defects in workmanship and materials, under normal use and service, for the following lengths of time from the date of purchase from 3Com or its Authorized Reseller:

Internetworking products	**One year**
Network adapters	**Lifetime**
Ethernet stackable hubs and unmanaged Ethernet fixed port repeaters	**Lifetime* (One year if not registered)**
***Power supply and fans in these stackable hubs and unmanaged repeaters**	**One year**
Other hardware products	**One year**
Spare parts and spares kits	**90 days**

If a product does not operate as warranted during the applicable warranty period, 3Com shall, at its option and expense, repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or refund to Customer the purchase price paid for the defective product. All products that are replaced will become the property of 3Com. Replacement products may be new or reconditioned. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer.

3Com shall not be responsible for any software, firmware, information, or memory data of Customer contained in, stored on, or integrated with any products returned to 3Com pursuant to any warranty.

SOFTWARE: 3Com warrants that the software programs licensed from it will perform in substantial conformance to the program specifications therefor for a period of ninety (90) days from the date of purchase from 3Com or its Authorized Reseller. 3Com warrants the magnetic media containing software against failure during the warranty period. No updates are provided. 3Com's sole obligation hereunder shall be (at 3Com's discretion) to refund the purchase price paid by Customer for any defective software products, or to replace any defective media with software which substantially conforms to 3Com's applicable published specifications. Customer assumes responsibility for the selection of the appropriate applications program and associated reference materials. 3Com makes no warranty that its software products will work in combination with any hardware or applications software products provided by third parties, that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected. For any third party products listed in the 3Com software product documentation or specifications as being compatible, 3Com will make reasonable efforts to provide compatibility, except where the non-compatibility is caused by a “bug” or defect in the third party's product.

STANDARD WARRANTY SERVICE: Standard warranty service for hardware products may be obtained by delivering the defective product, accompanied by a copy of the dated proof of purchase, to 3Com's Corporate Service Center or to an Authorized 3Com Service Center during the applicable warranty period. Standard warranty service for software products may be obtained by telephoning 3Com's Corporate Service Center or an Authorized 3Com Service Center, within the warranty period. Products returned to 3Com's Corporate Service Center must be pre-authorized by 3Com with a Return Material Authorization (RMA) number marked on the outside of the package, and sent prepaid, insured, and packaged appropriately for safe shipment. The repaired or replaced item will be shipped to Customer, at 3Com's expense, not later than thirty (30) days after receipt by 3Com.

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Some states do not allow the exclusion of implied warranties or the limitation of incidental or consequential damages for consumer products, so the above limitations and exclusions may not apply to you. This warranty gives you specific legal rights which may vary from state to state.

GOVERNING LAW: This Limited Warranty shall be governed by the laws of the state of California.

3Com Corporation
5400 Bayfront Plaza
Santa Clara, CA 95052-8145
(408) 764-5000

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FCC CLASS B CERTIFICATION STATEMENT

3Com Corporation
Model Nos: 3C871, 3C872, 3C876, 3C877
FCC ID: LP2QAREMOTE
Made in U.S.A.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1 this device may not cause harmful interference, and

2 this device must accept any interference received, including interference that may cause undesired operation.

WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules, and the Canadian Department of Communications Equipment Standards entitled, "Digital Apparatus," ICES-003. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from the one which the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

*The Interference Handboo*k

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

NOTE: In order to maintain compliance with the limits of a Class B digital device, 3Com requires that you use quality interface cables when connecting to this device. Changes or modifications not expressly approved by 3Com could void the user's authority to operate this equipment. Refer to the manual for specifications on cabling types.

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CANADIAN NOTICE

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operation, and safety requirements. The Department does not guarantee the equipment will operate to the users' satisfaction.

Before installing this equipment, users should ensure that is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: *Users should not attempt to make electrical ground connections by themselves, but should contact the appropriate inspection authority or an electrician, as appropriate.*

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